

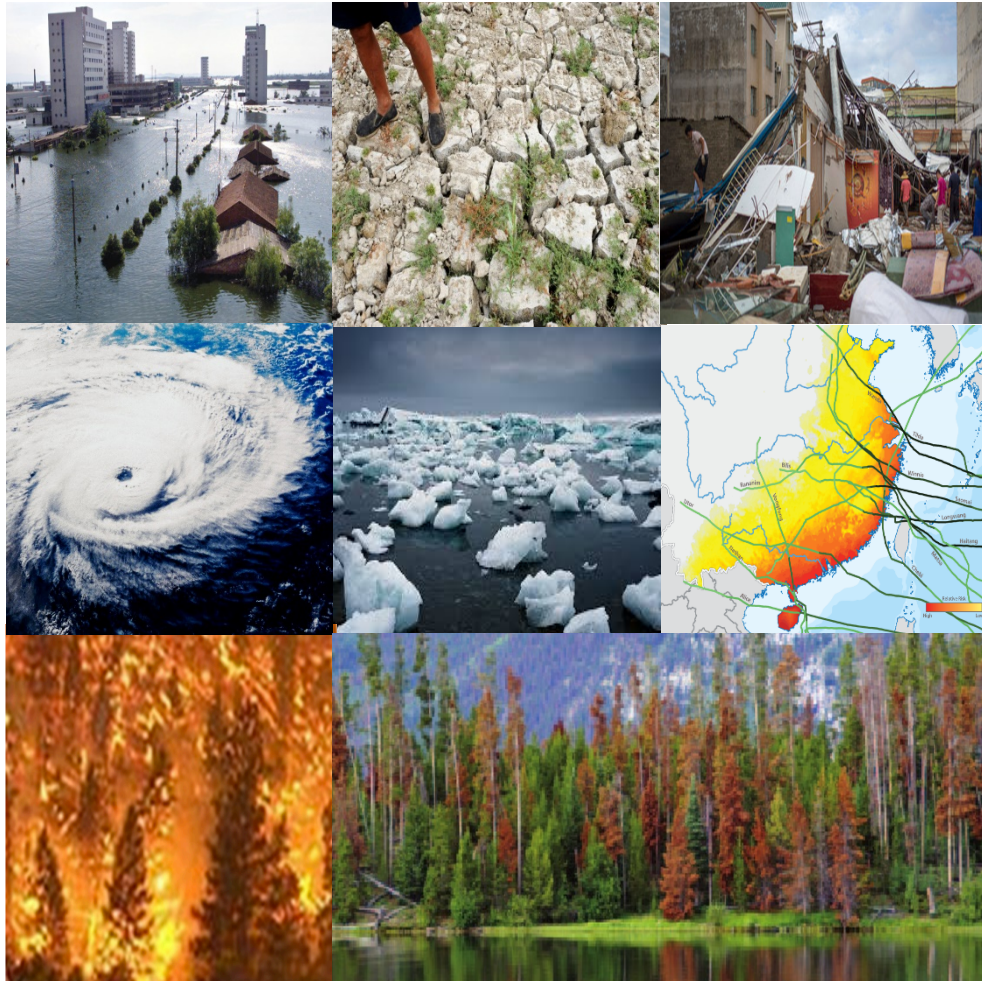
Predicting Future Climate To Drive Business Decisions



Climformatics

Subarna Bhattacharyya & Sourav Mazumder
Climformatics IBM

The Climate Risk Problem



Rising Temperatures

Changing Rainfall

Increasing Droughts & Floods

Intense Frequent Storms

Decrease in Fresh Water Supply

Changing Soil Conditions

Crop Pests, Diseases

Climate Change is a Risk Multiplier Destabilizing Entire Industries



\$1.2 trillion – Annual global financial losses due to climate disasters
1.6%↓ – Global impact to GDP due to climate change (source: The Guardian 2012 report)
\$8 billion – Financial losses in US due to climate change in 2014
(Source:NOAA)

Global Agriculture Market: \$4.8 Trillion

\$75B+ paid in US crop insurance since 2003

(source <http://investigatemidwest.org/2014/07/16/agricultural-act-of-2014-ensures-crop-insurance-costs-will-keep-climbing/>)

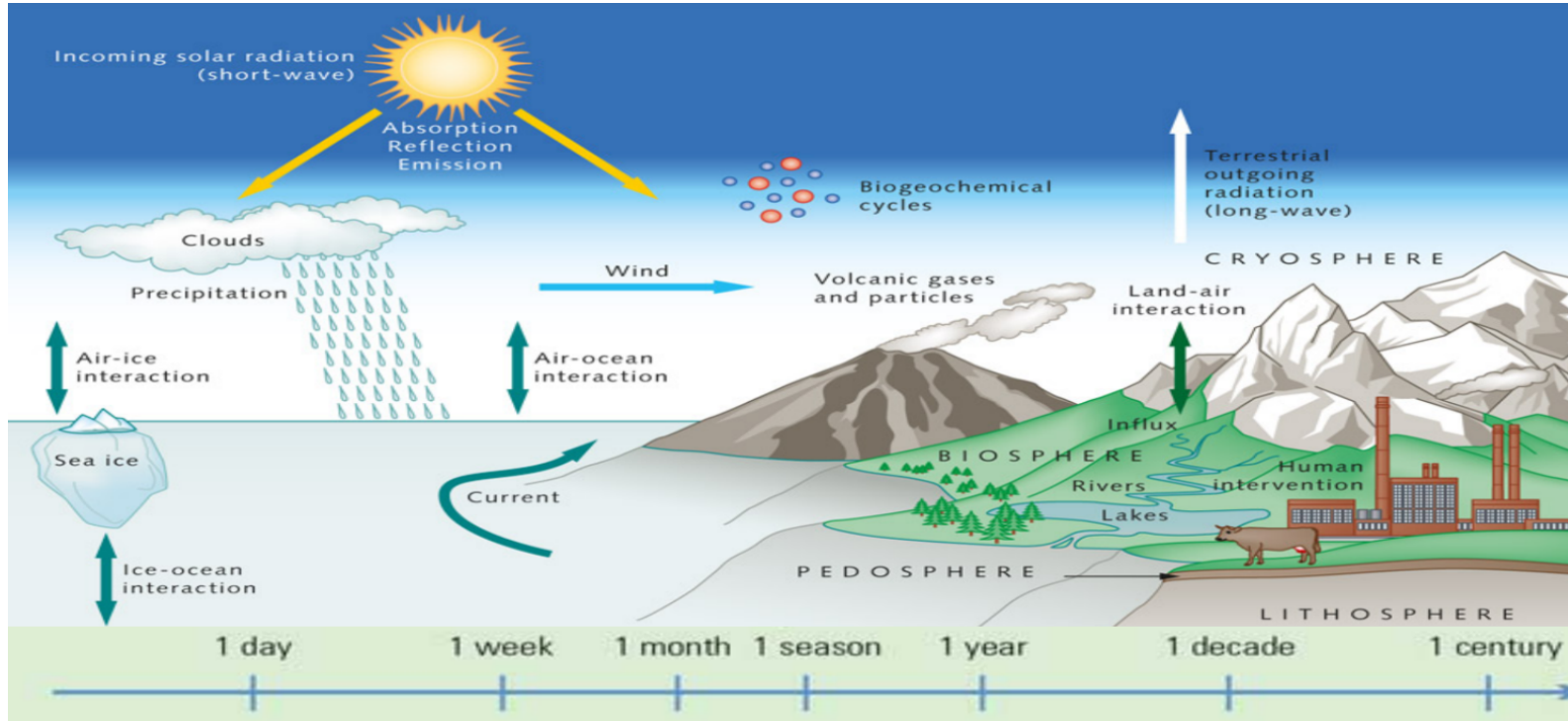
\$2.7B loss in CA Drought (2011-present) (source UC Davis 2015 Publication)

\$2B+ Citrus loss in CA Hard Freeze (source: Reuters, 2013)

Climate change will cause 15% annual loss by 2050 due to: (Source: Lobell & Field 2011 Climate Change)

- Decreasing winter chill periods
- Continued Warming
- Reduction of Spring runoff water

Earth's Climate Dynamics



Weather Scales 1hr – 2wk

Climate Scales > 1 month- 30yr

Weather Forecasting Models

Global Climate Models

Climformatics predicts YOUR climate











Providing farmers Actionable Data

Napa, CA Weather

1:52 pm PST

10-Day Forecast

[Expand Daily Details](#)

DAY	HIGH/LOW	COND	PRECIP	WIND	HUMIDITY
TODAY Nov 23	60°/45°	 Sunny	0%	SW 10 mph	75%
TUE Nov 24	54°/37°	 AM Rain	90%	WSW 17 mph	77%
WED Nov 25	55°/33°	 Partly Cloudy	10%	NNE 7 mph	69%
THU Nov 26	57°/34°	 Sunny	0%	NE 7 mph	50%
FRI Nov 27	58°/33°	 Sunny	0%	NE 10 mph	45%
SAT Nov 28	55°/33°	 Mostly Sunny	20%	ENE 7 mph	58%
SUN Nov 29	57°/35°	 Sunny	10%	ENE 7 mph	64%
MON Nov 30	58°/40°	 Partly Cloudy	20%	ENE 7 mph	61%
TUE Dec 1	60°/39°	 Mostly Sunny	20%	SSE 7 mph	69%
WED Dec 2	63°/42°	 PM Showers	50%	SSE 8 mph	77%

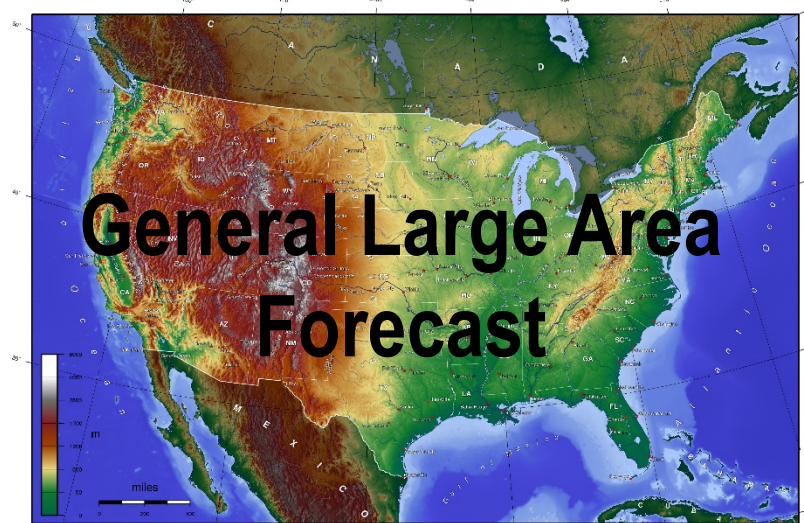
Weather-based tools cannot predict beyond 1-10 days

Farmers Need Seasonal, Annual & Multi-Year Climate Prediction data so they can decide:

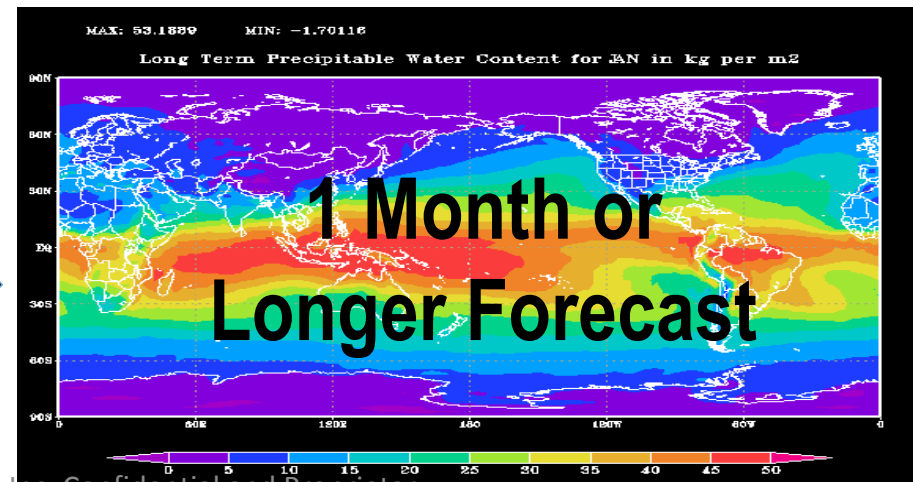
- What new crops to grow
- Where to grow
- For how long
- When to plant
- When to harvest

Our Unique Edge

Current Tech



Our Solution



Our Unique Edge

Current Tech

The Weather Channel 34° Fremont, ... 59° Fremont, ... + Search city, zip, or place

Fremont, CA Weather
Observation as of 11:25 pm PDT

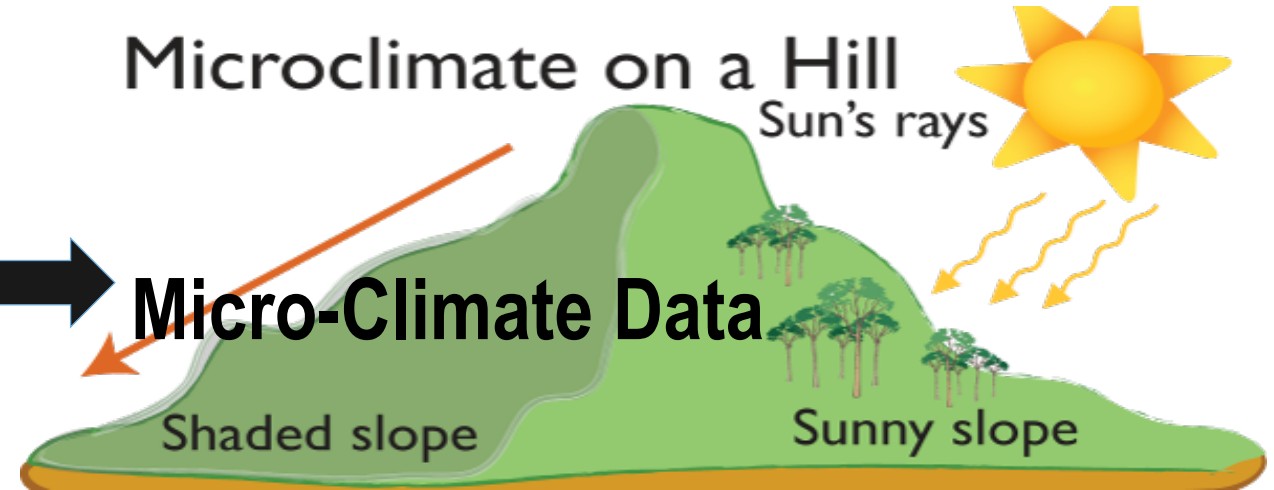
59°F
Feels Like 59°

Weather Data

DAY	COND	TEMP	DESCRIPTION	PRECIP	WIND
TONIGHT	☁	55°	Mostly Cloudy	0%	WNW 3 mph
SUN	☀	73°	AM Clouds/PM Sun	0%	NW 12 mph
SUN NIGHT	☁	53°	Mostly Cloudy	0%	WNW 8 mph

Wind Calm
Humidity 82%
Dew Point 54°F
Pressure 29.98 in ↓
Visibility 9.0 mi
UV Index 0 out of 10

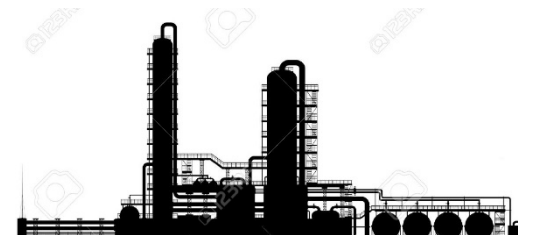
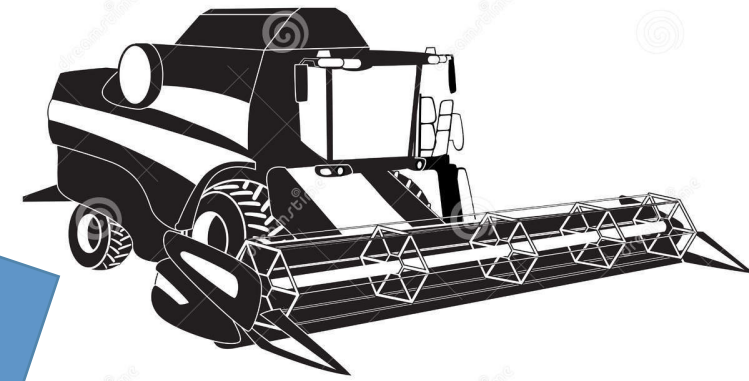
Our Solution



Weather Driven Risk

**Long Term Climate Driven
Catastrophe Risk**

How we do it?



Our Spark based Big Data Technology

Observation Data

Location Data

Exposure Data

Spark

System ML

GraphX

Python APIs

Scientific Format Transformation

Climate Data Analysis

Micro Climate Graph Identification

Climate Prediction

Climate Driven Catastrophe Risk Assessment

Object Storage

Climate Model Simulation

Data Storage & Archival

Java Web Portal on IBM Softlayer

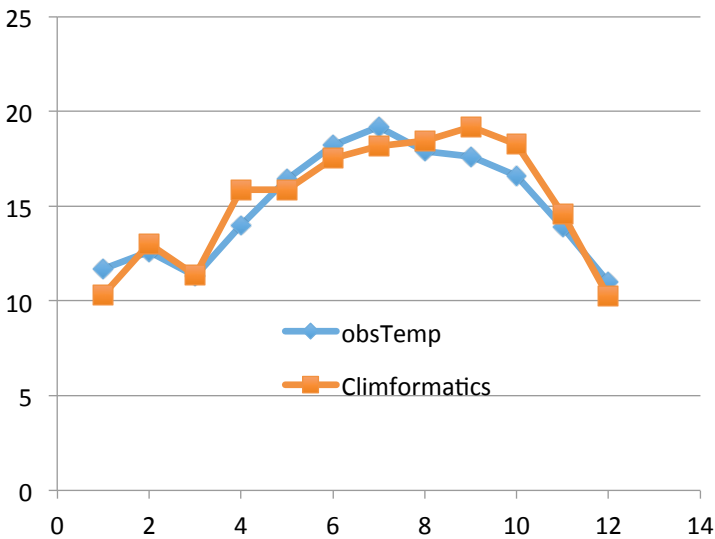
IBM Bluemix Cloud



2006 Climate Prediction Results

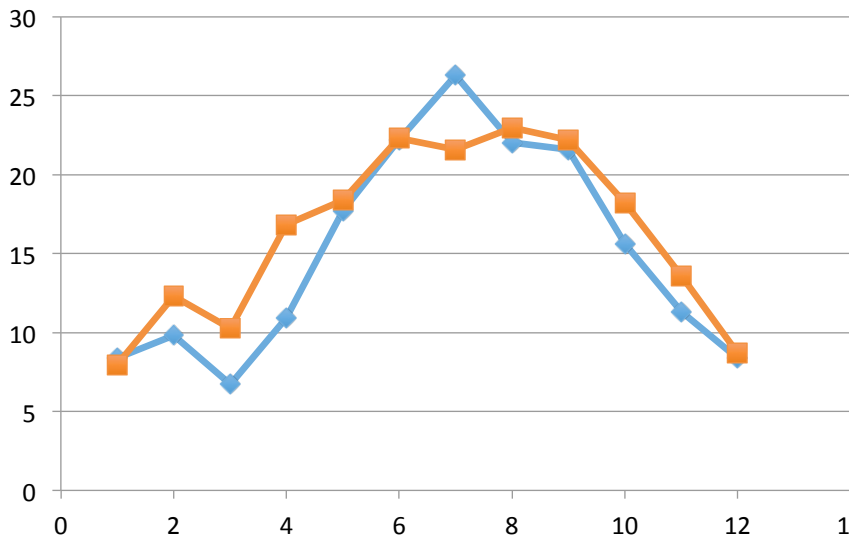
OAKLAND

MONTH	obsTemp	Climformatics
1	11.7	10.30658571
2	12.6	12.99165238
3	11.3	11.35648095
4	14	15.87225714
5	16.4	15.8549381
6	18.2	17.53398571
7	19.2	18.15984762
8	17.9	18.44710476
9	17.6	19.17101905
10	16.6	18.2691381
11	13.9	14.59085238
12	11	10.23307619



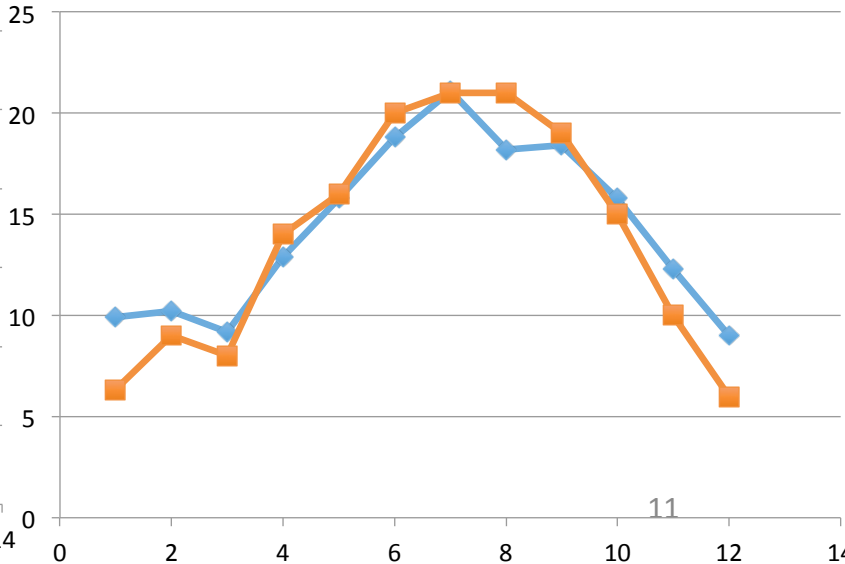
LIVERMORE

MONTH	obsTemp	Climformatics
1	8.4	7.956114286
2	9.8	12.29735238
3	6.7	10.24697143
4	10.9	16.82607143
5	17.7	18.3871
6	22.2	22.29849524
7	26.3	21.57377619
8	22	22.96337619
9	21.6	22.20520476
10	15.6	18.23770476
11	11.3	13.57412381
12	8.4	8.721742857

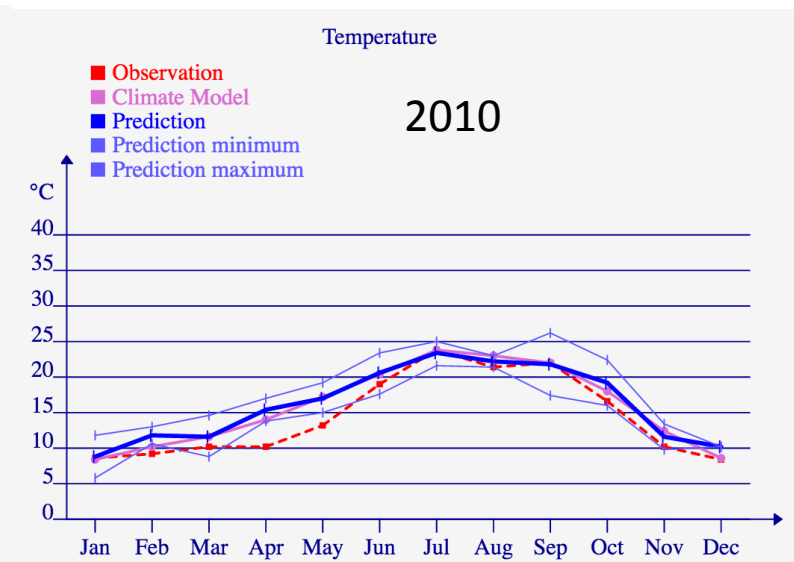
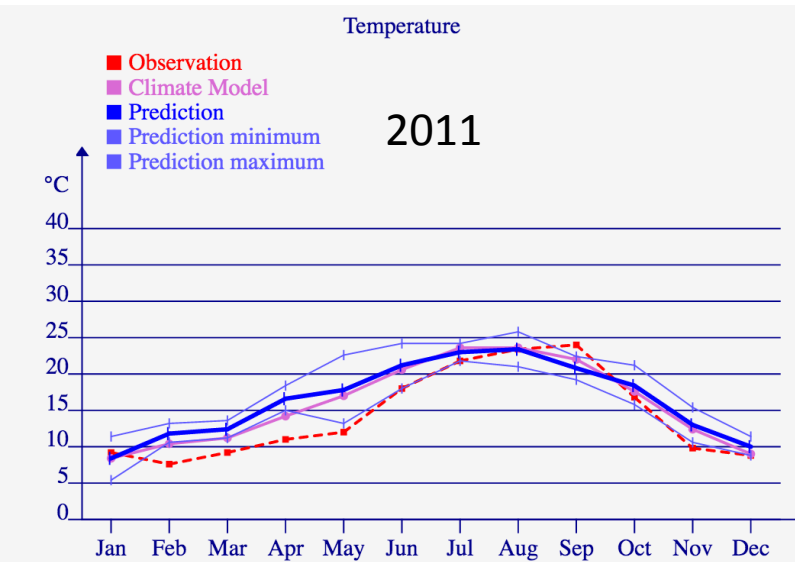
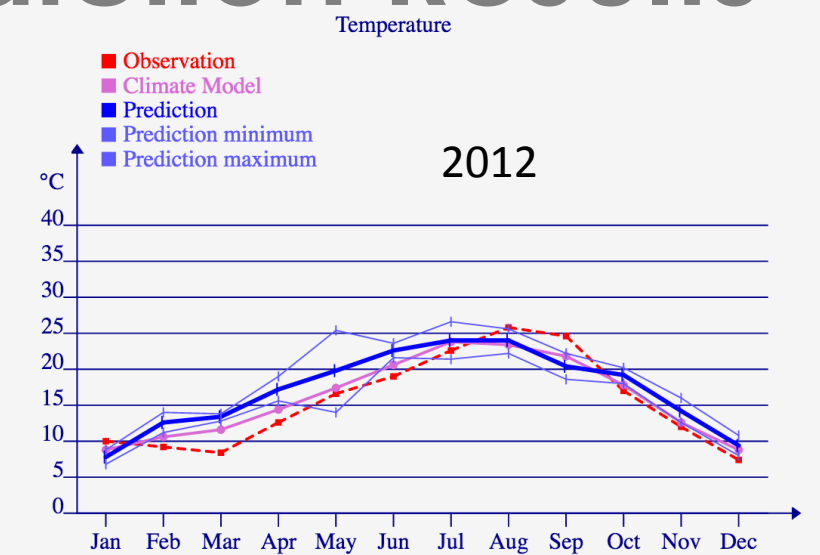
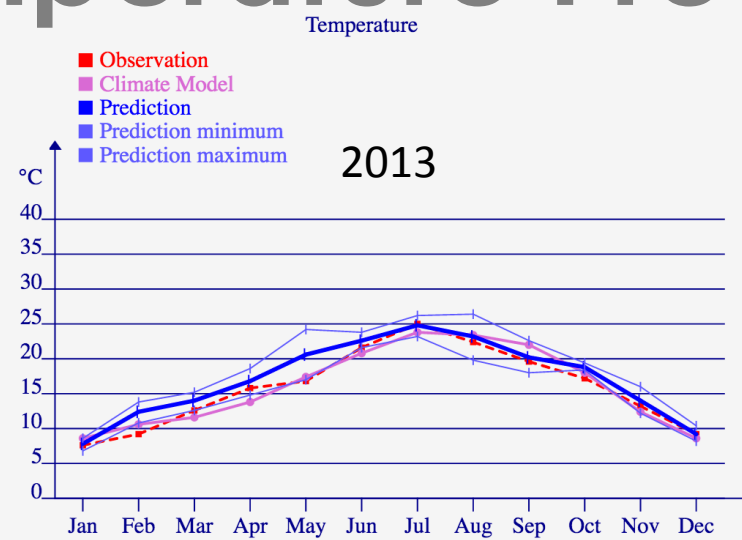
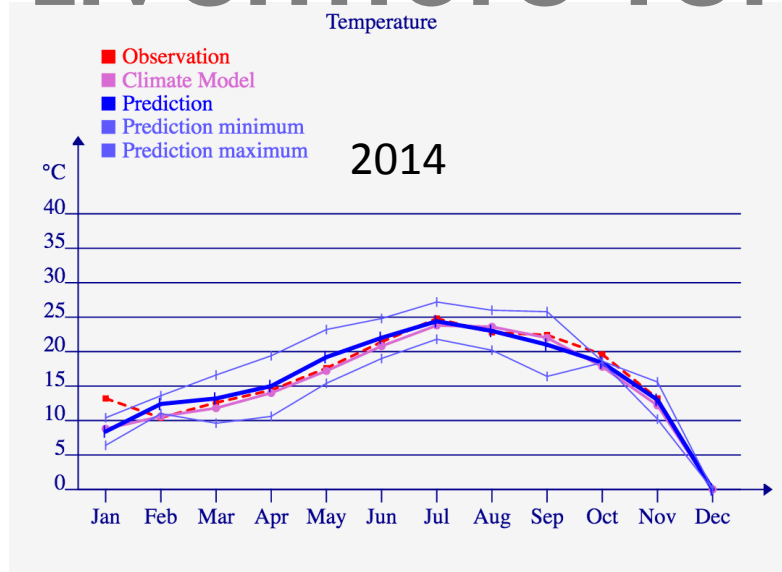


Santa Rosa

MONTH	obsTemp	Climformatics
1	9.9	6.32
2	10.2	9.00
3	9.2	8.00
4	12.9	14.00
5	15.8	16.00
6	18.8	20.00
7	21.1	21.00
8	18.2	21.00
9	18.4	19.00
10	15.8	15.00
11	12.3	10.00
12	9	6.00



Livermore Temperature Prediction Results



Predict Your Climate (Demo)

<http://mgg-design.com/clim/graph/pred/index.html>

CLIMFORMATICS
... keeping you informed about the climate change, so you can make the right decisions!


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The PROBLEM
Drought
2013-2014 Severe Drought in California
\$2.2 billion loss


The SOLUTION
... more

CLIMATE DATA PORTAL

At CLIMFORMATICS we offer the crop-growing communities valuable insight about the effects of climate change, and help to stay informed of its impacts on their activities and business operations. We build our technology applying expert level knowledge to meet immediate customer needs.


Agriculture


Water Conservancy


Energy Efficiency

Find out about the CLIMATE in your area

DATA PORTAL


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Weather & Climate


San Francisco County



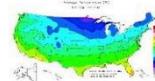
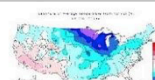
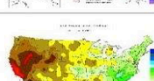
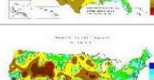
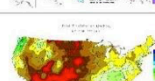
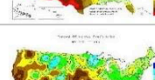
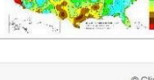
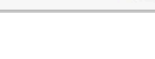

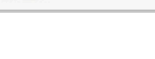

Google

Current Weather
Jul 25, 2014 2:18 AM
As reported at: Petaluma Hill
Change weather station
Switch to Celsius
Today: **Hi: 81°F**
Partly cloudy in the morning then becoming sunny. Highs in the lower 70s to mid 80s. Southwest winds 3 to 10 mph. Becoming west 10 to 20 mph in the afternoon. ... more
Tonight: **Lo: 60°F**
Clear. Lows in the mid 50s to lower 60s. Southwest winds 10 to 20 mph. ... more

Climate State

Graphic Display **Table Display**

San Francisco, CA

Graphic Display **Table Display**

San Francisco, CA

	Past	Now	Future	
		Summer	Winter	Annual
Average Temperature				
Temperature Anomaly				
Total Precipitation				
Percent per Normal Precipitation				

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Actionable Recommendations

- Use drought resistance crop techniques
- Customize your pesticides
- Pest Resistance
- Extreme weather crop protection through genetical methods.

Business Model – Enterprise Services

Customer profile

- Large user with distinctive needs (for instance, needing catered climate model analysis/runs) to assess customized microclimate prediction
- Large user with bulk predictive report requirement
- Active interest from Agri-Weather company
- Business decisions like demand forecasting for retail, energy industry
- Operations and logistics planning

Our Team

Subarna Bhattacharyya,
Risk Modeling & Climate Data Scientist



Drew Felker,
Marketing Executive

Detelina Ivanova,
Climate Modeling Scientist

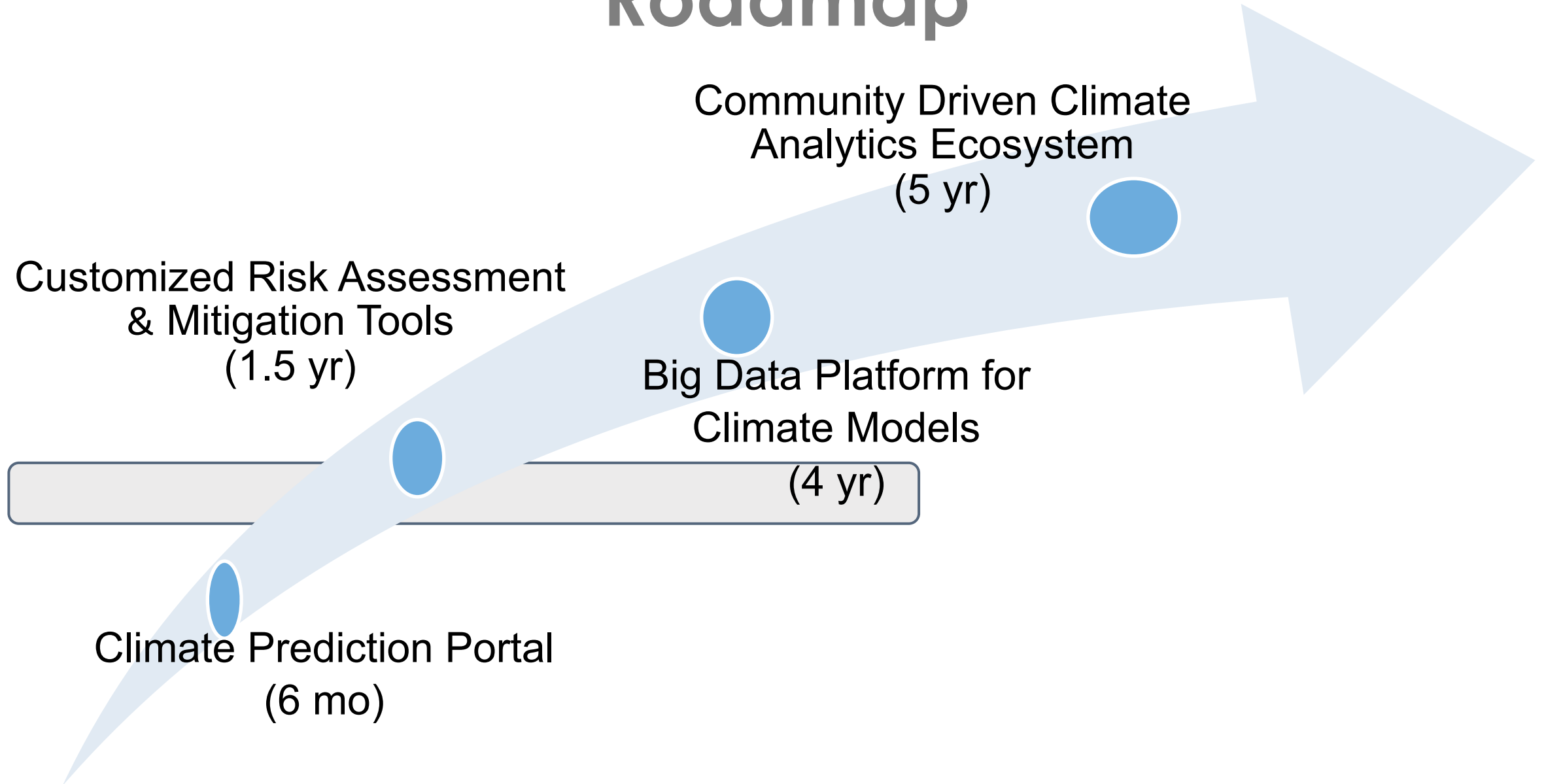


Velimir Mlaker,
Computer Scientist



Marc Gottschalk
Sidley Austin LLP

Roadmap



Our Massive Transformative Purpose

To help businesses prepare & hence mitigate the inescapable impact of changing climate

- Develop Sustainable Platform for Climate Prediction
- Design Risk Analytics based on Climate Change Peril
- Create Big Data technology for Climate Models
- Make Climate Data Consumable
- Pioneer a Climate Industry

Thank You

Progress/Status

- Building Minimum Viable Product on IBM's Spark platform
- Agri-weather space customer valued at \$10 Billion: pilot projects underway
- Active Interest shown by retail space customer
- IBM is providing all tech support & marketing
- Invited to IBM Global Insight 2015 as a Client Reference at Las Vegas
- Invited to IEEE Big Data Conference in Santa Clara Nov 2015
- Invited to EIR Meeting at Lawrence Livermore Natl Lab, Nov 2015

Feathers In our Hat

- Climformatics invited to join iGate Ideahub for Incubation
- Climformatics, a semifinalist at 2014 Clean Tech Open (CTO) caught IBM's interest and was invited to join IBM's Global Entrepreneurship Partner Program.
- Climformatics partners with IBM
- Climformatics is winner of the 2014 Western US Category Finalist CTO Business Model Competition Award
- Climformatics was one of the 6 Bay Area companies selected to present pitch at Hanhai Chinese investors meet in San Jose.
- Climformatics invited to IBM Insight 2015 as a client reference for panel on Spark.
- Invited to IEEE Big Data Conference in Santa Clara Nov 2015
- Invited to EIR Meeting at Lawrence Livermore Natl Lab, Nov 2015
- Invited talk at UC Davis Graduate School of Management Jan 2016
- Invited talk at IBM Spark Technology Center MeetUp San Francisco Feb 2016

Competition

Climate Risk Assessment Platform

	Insurance Companies			Weather/AgTech Companies			
Product/Service Capabilities	Climate Corporation (acquired by Monsanto 2013 for \$1.1B)	Climate Impact Company	ADM Crop Risk Services	Global Ag	Weather Channel	awhere	Climformatics
Climate data based Risk model	X	X	X	X	X	X	✓
Climate risk modeling	X	X	X	X	X	X	✓
Short-term Weather- risk	✓	✓	X	X	✓	✓	✓
Observation based data	✓	✓	X	X	✓	✓	✓
Statistical Datamining capabilities	✓	✓	✓	✓	✓	✓	✓

Business Model – Automated Service

Actionable Recommendations through C/Risk™ Reports

C/Risk
Basic

C/Risk
Silver

C/Risk
Gold

\$150 per report	\$295 per report	\$495 per report
1month-1 year timescale	1/5/10 year timescale	1/5/10 year, risk assessment & mitigation advice

Our Ask

What do we need?
Cash + advisory

\$1.5M to Climate Portal

Terms: 25% Equity, Convertible Notes